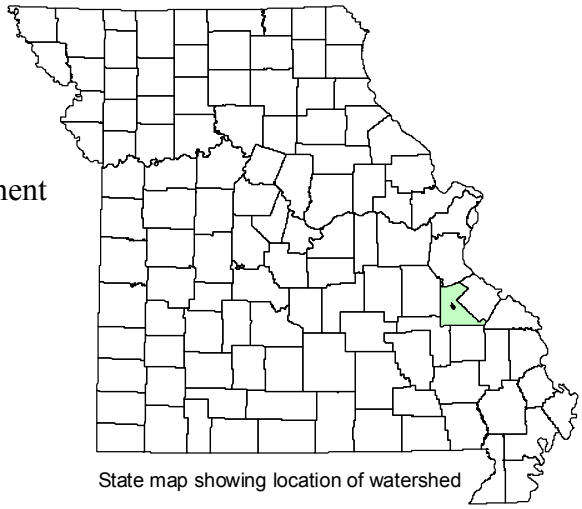
Missouri Department of Natural Resources

Total Maximum Daily Load Information Sheet

Shaw Branch

Water Body Segment at a Glance:

County: St. Francois
Nearby Cities: Park Hills
Length of impairment: 2 miles
Pollutants: Cadmium and Lead in Sediment
Source: Federal Abandoned Mine Land
Water Body ID: 2170


State map showing location of watershed

Scheduled for TMDL Development: 2010

Prior TMDL: Approved in 2010 for Nonvolatile Suspended Solids (NVSS) and Dissolved Lead

Description of the Problem

Beneficial uses of Shaw Branch

- Livestock and Wildlife Watering
- Protection of Warm Water Aquatic Life
- Human Health Protection (Fish Consumption)

Use that is impaired

- Protection of Warm Water Aquatic Life
- General Criteria

Standards that apply

- Missouri's Water Quality Standards applicable for metals found in 10 CSR 20-7.031(4)(B)1 state:

  Water contaminants shall not cause the criteria in Tables A and B to be exceeded. Concentrations of these substances in bottom sediments or waters shall not harm benthic organisms and shall not accumulate through the food chain in harmful concentrations, nor shall state and federal maximum fish tissue levels for fish consumption be exceeded.

- Missouri has no numeric criteria for metals in sediment. Likewise, the U.S. Environmental Protection Agency has not yet established federal guidelines for toxic chemicals in stream or lake sediments. In lieu of such criteria, Probable Effect Concentrations, or PECs, suggested by

McDonald, et. al[1], are used. PECs are the concentrations above which some toxic effect on aquatic life is likely.

- The general (or narrative) criteria that apply to Shaw Branch are found at 10 CSR 20-7.031(3) (D) and (G):

  (D) Waters shall be free from substances or conditions in sufficient amounts to result in toxicity to human, animal or aquatic life.

  (G) Waters shall be free from physical, chemical or hydrological changes that would impair the natural biological community.

Background information and water quality data

Shaw Branch is a tributary to Flat River Creek. A TMDL for Big River, Flat River Creek and Shaw Branch was approved by the U.S. Environmental Protection Agency on March 24, 2010. It can be read on the Web at: www.dnr.mo.gov/env/wpp/tmdl/2074-2080-2168-2170-big-r-tmdl.pdf

The impaired portion of Shaw Branch is located in the "Old Lead Belt" region of southeast Missouri. For more than 100 years, this area produced nearly 80 percent of the nation's mined lead. The St. Joe Lead Company acquired the Shaw Branch site from the Federal Lead Company in 1864. In 1972, the renamed St. Joe Minerals Corporation stopped production of lead at the site. The mining complex, along with 8,000 acres of land, was donated to the state in 1976 to be used for recreational purposes.

The upper mile of Shaw Branch was buried under a large tailings pond, the Federal Tailings Pond, as part of the milling operations. Subsequent erosion of tailings has occurred to the lower mile of Shaw Branch, located downstream of the tailings pond. So much sediment has been deposited in this portion of Shaw Branch that the stream channel has been almost completely buried in tailings and provides very little aquatic habitat. The map on page 3 shows only the lower mile of Shaw Branch. The upper one-mile of Shaw Branch is to the south and lies underneath the tailings pond shown at the bottom of the map.

Not only is Shaw Branch inundated with sediment, but these sediments are also contaminated with lead and cadmium. The relationship between the amount of a toxicant in sediment and the strength of the toxicity it exerts is not simple or straightforward. While neither Missouri nor EPA has standards or guidelines for sediment toxicity, the U.S. Geological Survey has reviewed of a large number of research papers on the subject. Based on this review, the USGS suggests numeric guidelines that could be used to judge the potential for toxicity to aquatic life. These are the PECs mentioned in the last bullet under "Standards that apply" above.

The department conducted sediment monitoring from 1997to 2006. The mean, or average, level of lead in the sediments for Shaw Branch is 4756 mg/kg, or milligrams per kilogram, which is the same as parts per million. This is 37 times the PEC (Figure 1). The mean level of cadmium in the sediments for Shaw Branch is 7.76 mg/kg. This is more than one and a half times the PEC (Figure 2). Based on the location of the sediment sampling site in relation to known or suspected sources of metals, Shaw Branch is judged to be impaired by cadmium and lead in the sediment. Data prior to

[1] *Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems*, D. MacDonald, et al., 2000. USGS

2000 was included in this assessment because the department knows of no pollution controls established that would make the data unrepresentative of current conditions.

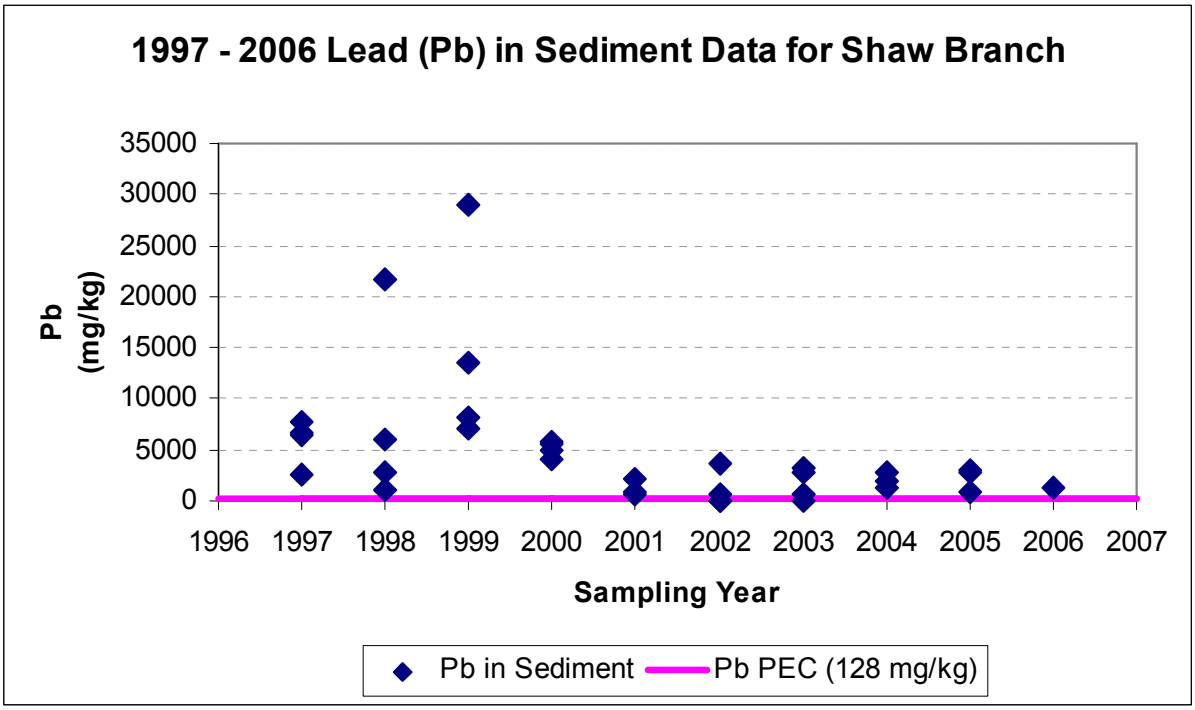


Figure 1

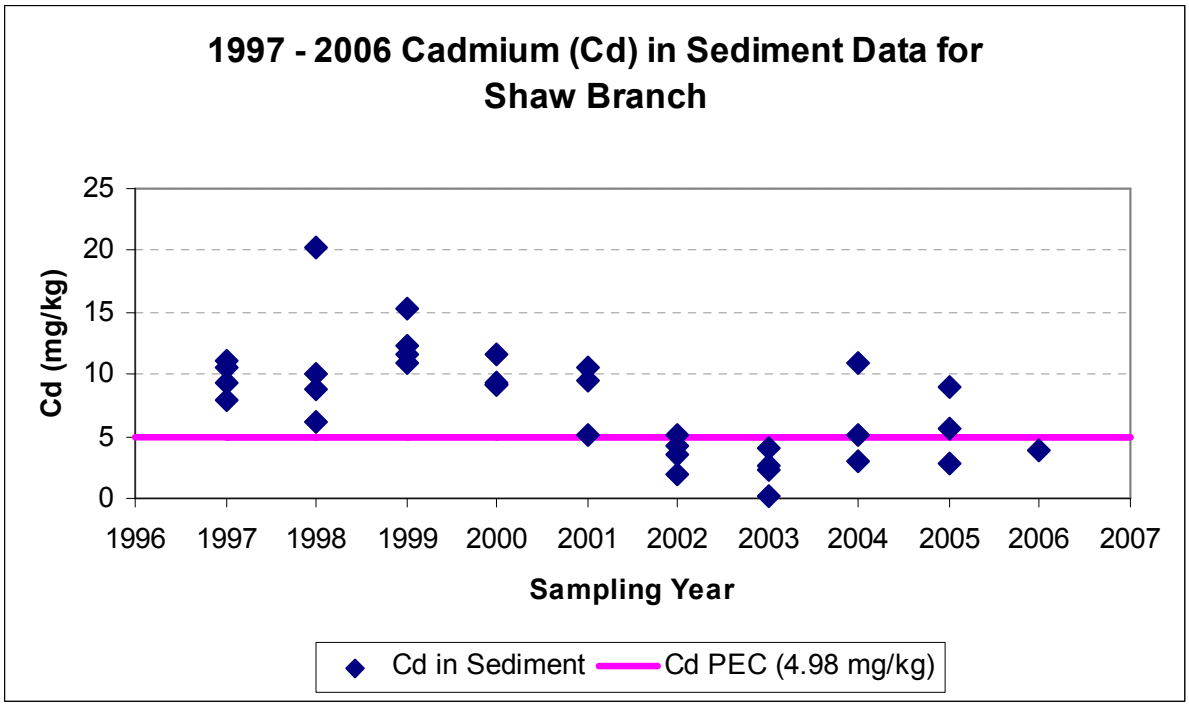
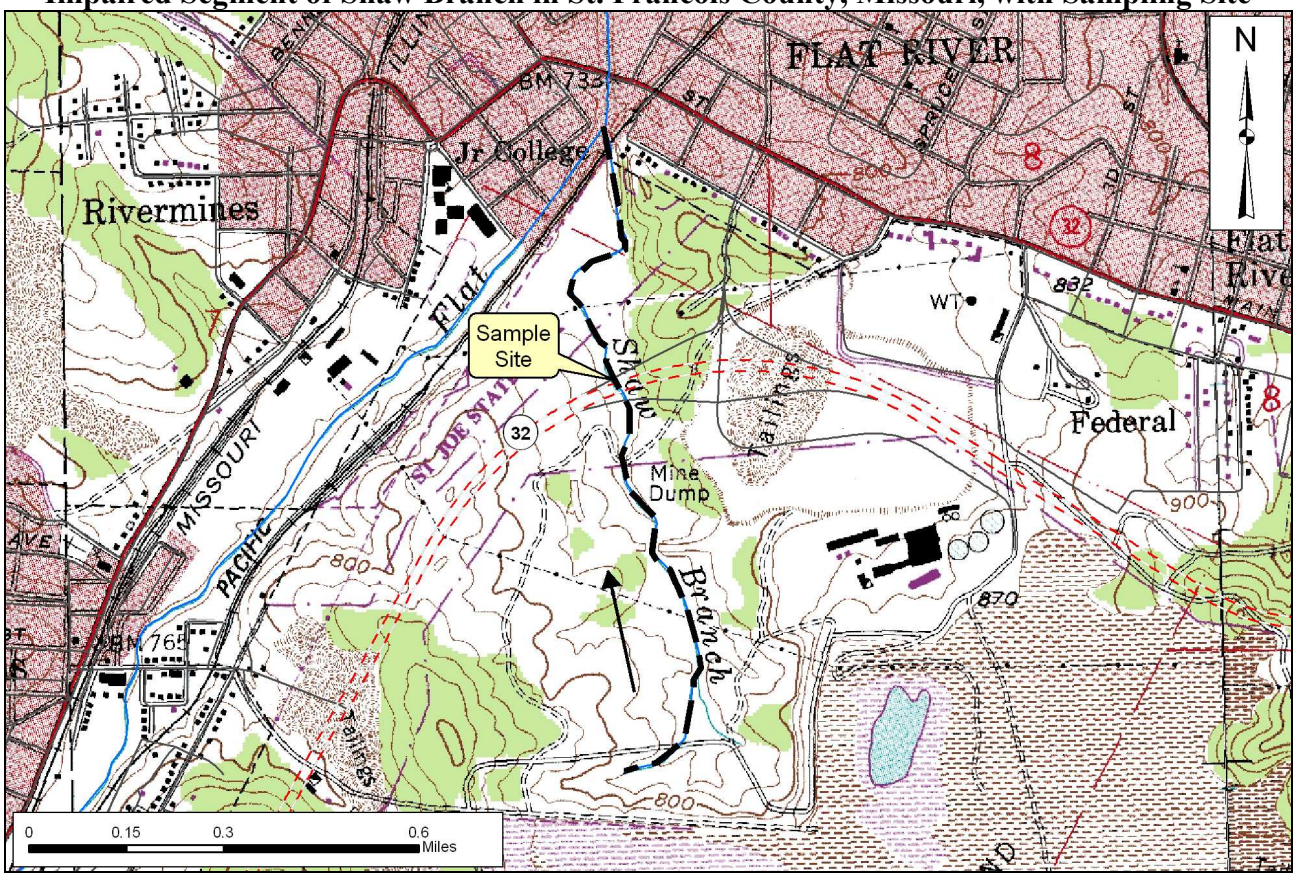


Figure 2

Impaired Segment of Shaw Branch in St. Francois County, Missouri, with Sampling Site



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